

Attachment 8. Economic Analysis – Water Supply Costs and Benefits

Rancho Palos Verdes

San Ramon Canyon Stormwater Flood Reduction Project

The Future Without the Project vs. the Future With the Project

Note to evaluator: Please refer to Attachments 3 and 7 for a detailed description of the background, proposed project, detailed budget, maps, and visuals of the project site. For sake of brevity, a comprehensive narrative is not repeated here.

Summary Background and Project Description

(please see Attachments 3 and 7 for comprehensive narratives)

San Ramon Canyon is a natural, typically dry canyon streambed in the City of Rancho Palos Verdes that sits directly north of and above Palos Verdes South (PVDS)/25th Street in the City of Los Angeles. It is surrounded by residential homes to the north, Friendship Park to the east, Palos Verdes Drive East (PVDE) switchbacks to the west, and PVDS/25th Street and 242 mobile homes to the south. Since the 2005 storm events, the canyon has been eroding at an accelerated and alarming rate. During moderate to severe rain events, the canyon conveys storm water runoff generated from the upstream tributary watershed approximately 3,300 feet downstream. It is then directed to a storm drain inlet system at PVDS/25th Street, constructed over 50 years ago, that can now no longer accommodate the water delivered to it. Floodwater, mud and debris overwhelm the inlet and spill out onto 25th Street, blocking traffic and requiring repeated efforts by the City of Rancho Palos Verdes and the City of Los Angeles to clean up the area. The mud and debris flows, and the resulting cleanup efforts, severely restrict access to the area for both motorists and safety/emergency personnel.

The proposed project consists of the construction of a mid-canyon inlet structure, located slightly upstream of the upper switchback along PVDE and the highly-erodible section of the canyon. The inlet structure is connected to shoreline outfall with a 3,900-foot long, 54-inch pipe in a “tunnel alignment” that outlets below the oceanfront bluffs. The entire length of this storm drain (SD) alignment falls within the City of Rancho Palos Verdes (RPV) allowing RPV sole jurisdiction.

Furthermore, the alignment is almost entirely within city-owned land, requiring only small maintenance and construction easements. The inlet structure will be located in the “middle” of San Ramon Canyon, which will intercept flood waters north of the Tarapaca Landslide. The storm drain conveys flows from the inlet structure southwesterly through a tunnel approximately 1,900-feet in length to a point just south of PVDS. From there, the next 1,700-feet of the pipeline will be constructed, using the standard open trench (cut and cover) type of construction running parallel to



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the City boundary adjacent to Palos Verdes Shores Mobile Home Park in the City of Los Angeles. The pipe will be installed within an existing dedicated 100-foot-wide utility easement within Palos Verdes Shoreline Park that was specifically set aside for utilities such as this proposed storm drain. The 100-foot-wide easement has less strict environmental impact mitigation requirements, serves as a firebreak for the adjacent mobile home park, and includes an informal hiking trail to the ocean, which will be further enhanced by this project. The final 300-feet of pipe from the bluff top to the beach will run in a 38% sloped “slant drain” tunnel to an outlet structure located at the base of the bluff. The portion of the canyon downstream of the mid-canyon inlet structure, which runs through the Tarapaca landslide, will be back-filled up to 30-feet deep with dirt. This gravity buttress will restore the streambed to its former elevation, and will stabilize both the canyon side slopes. This portion of the canyon would convey side slope run-off along an engineered, natural, predominantly soft-bottom creek bed. An access road from PVDE along the westerly side of the canyon would be constructed adjacent to the creek bed to provide access for maintenance of the upstream inlet structure.

The following water supply costs and benefits will be realized as a result of implementing the San Ramon Canyon Stormwater Flood Reduction Project:

Table 14: Annual Cost of Water Supply Project / Table 15: Annual Water Supply Benefits

This project does not alter the annual cost of water supplies. The project deals with storm water runoff that is not captured or treated. The proposed project does not change this condition although it will make the storm water runoff less damaging and less polluted. San Ramon Canyon does not recharge a ground water basin that is used for drinking water supplies. Therefore neither Table 14 nor Table 15 is included in this analysis.

Table 16 - Annual Costs of Avoided Projects

With the implementation of the preferred project, the City will avoid four major capital improvement projects that would be jointly required to provide the same level of protection. Ultimately, if the proposed project is ***not implemented***, the following projects will be required to improve the retention of flood water and debris and to improve the channeling of storm water flows. The first three projects must be completed jointly and therefore are considered “one project” for purposes of this analysis. The fourth project, the caissons, could be a stand-alone avoided project. Therefore, the City has completed two “Table 16’s” as requested by the PSP.

The projects are:

Project #1:

- 1.1 Replace the garden wall with a true retaining wall;
- 1.2 Install a large box culvert underneath PVDS/25th Street;
- 1.3 Construct a debris basin.

Project #2:

- Install caissons along PVDE; and

The City discussed these four “avoided” projects with the DWP staff and DWP consultants, who both advised the City to use Table 16 to calculate the present value of these avoided projects.

The total present value of the avoided projects is \$12.008 million. The following narrative describes each calculation:

1.1 Replace Garden Wall with Retention Wall (\$799,680 estimated cost in year 2010): The City has estimated that the most immediate action that would be taken if the proposed project is not implemented is to replace the current garden wall (that is acting as a protective dam or levee) with a true retaining wall. This effort is selected as the first line of defense because it is a relatively quick improvement to provide flood protection and can be performed without major demolition and excavation. The project includes removing vegetation and the existing garden wall, excavating sufficiently to develop a proper retaining wall foundation, and building the wall and repairing the sidewalk and landscaping. This action must occur within the immediate future because of potential liability exposure to the Cities. The estimated cost of \$799,680 was calculated by KOA Engineering and included as a 2010 cost because the project would be completed in "year 1." The detailed cost estimate prepared by KOA Engineering is as follows:

CONSTRUCT RETAINING WALL

Length 620'

Task	Description	Qty	Unit	Cost/Unit	Total Cost
1	Mobilize and Clear and grub	1	LS	\$50,000	\$50,000
2	Demolish	1	LS	\$5,000	\$5,000
3	Unclassified Excavation	300	cyd	\$20	\$6,000
4	Construct reinforced concrete retaining wall	820	ft	\$580	\$475,600
5	Reconstruct sidewalk	5,200	SF	\$6	\$31,200
9	Install Landscape	3,400	sf	\$8	\$27,200
					\$595,000
Contingency				20%	\$119,000
Total Construction Estimated Cost					\$714,000
Design cost				7%	\$49,980
Construction management and Inspection				5%	\$35,700
TOTAL PROJECT COST					\$799,680

Estimated time required 2 months



Figure 1

Building a true retaining wall is one of three complementary avoided projects. The block wall actually has a “bend” in it from the year-after-year compression of mud, silt, and sludge.



Figure 2

Another view of the extent of debris removal and the cinder block garden wall that acts as the “barrier” between San Ramon Canyon and the 250 modular homes.

1.2 Box Culvert (\$1,849,963 estimated cost in year 2011): The retaining wall will provide flood water retention and protection but the pipe’s capacity underneath the street needs to be increased to handle historic storm water runoff. This effort is significantly more complicated and costly and includes excavating through PVDS/25th Street and constructing a box culvert with the capacity to handle anticipated storm water runoff. The effort includes installing a new downstream outlet, repairing roadway embankments, catch basins, laterals, and a sewer line. The estimated cost of \$1,849,963 was calculated by KOA Engineering and is included as a 2011 cost because the project would be completed in “year 2.” The detailed cost estimate is as follows:

Construct Box Culvert under 25th Street at San Ramon

Construct Temporary widening and install traffic controls

Remove and stockpile half of road width at a time

Construct a box culvert that can accommodate a loader under the roadway

Bench existing canyon sides

Construct sub-soil drainage system

Construct replacement embankment

Reconstruct the sewer

Construct road base and pavement

Install guardrails, drainage, road markings etc.

Reconstruct section of wall

Task	Description	Qty	Unit	Cost/Unit	Total Cost
1	Mobilize and Clear and grub	1	LS	\$250,000	\$250,000
2	Temp widening of road to accommodate traffic incl paving	4,000	sf	\$25	\$100,000
3	Unclassified Excavation	3,000	cyd	\$20	\$60,000
4	Box culvert	100	ft	\$3,000	\$300,000
5	Bench excavation	1	LS	\$30,000	\$30,000
6	Install underdrains	1	LS	\$25,000	\$25,000
7	Install inlet structure to existing downstream system	1	LS	\$30,000	\$30,000
8	Construct new roadway embankment	3,000	cyd	\$20	\$60,000
9	Construct base	4,000	sf	\$8	\$32,000
10	Pave roadway - AC	200	Tons	\$125	\$25,000
11	Construct new Catch basins and laterals	4	EA	\$10,000	\$40,000
12	Install Guardrails	100	ft	\$50	\$5,000
13	Install markings	1	LS	\$5,000	\$5,000
14	Construct new section of property wall	50	ft	\$85	\$4,250
15	Install and maintain sewer by-pass	1	LS	\$50,000	\$50,000
16	Install new sewer line	100	ft	\$300	\$30,000

\$1,046,250

Contingency

35%

\$366,188

Premium for "emergency" work

10%

\$104,625

Total Construction Estimated Cost**\$1,517,063**

Environmental Permitting and Fees

\$75,000

Geological Investigation and Design cost

10%

\$151,706

Construction management and Inspection

7%

\$106,194

TOTAL PROJECT COST**\$1,849,963**

Estimated time required

7 months

1.3 Debris Basin (\$6,373,411 estimated cost in year 2012): The final protection requirement would be the development of a debris basin with the capacity to handle the anticipated debris that comes down San Ramon Canyon. This effort includes the acquisition of 5 acres of land (valued at \$750,000/acre) for the development of the basin. Once the land is acquired, the City will excavate, install piping to connect to the existing drainage system, construct under drains, inlet chimney, fencing, and an access road. The estimated cost of \$6,373,411 was calculated by KOA Engineering and included as a 2012 cost because the project would be completed in "year 3." The detailed cost estimate is as follows:

Debris Basin

Area of basin and maintenance access = 5 acres

Shape area

Construct debris basin wall

Install drainage pipe

Construct sub-soil drainage system

Construct chimney inlet

Reconstruct access road

Fencing and signage

Task	Description	Qty	Unit	Unit/Cost	Total Cost
1	Mobilize and Clear and grub	1	LS	\$250,000	\$250,000
3	Unclassified Excavation	30,000	cyd	\$20	\$600,000
4	Pipe Culver to existing system	200	ft	\$600	\$120,000
5	Construct wall	8,000	cyd	\$25	\$200,000
6	Install underdrains	1	LS	\$25,000	\$25,000
7	Install chimney inlet structure	1	LS	\$30,000	\$30,000
8	Construct PCC overflow	870	cyd	\$120	\$104,400
9	Construct access road	6,999	sf	\$7	\$48,993
10	Fencing and signage	1	LS	\$5,000	\$5,000
11	Purchase Land	5	acres	\$750,000	\$3,750,000

\$5,133,393

Contingency

20%

\$1,026,679

Total Construction Estimated Cost

\$6,160,072

Environmental Permitting and Fees

\$75,000

Geological Investigation and Design cost

6%

\$83,004

Construction management and Inspection

4%

\$55,336

TOTAL PROJECT COST

\$6,373,411

Estimated time required

6 months



Figure 5

The construction of a \$6.4 million debris basin and subsequent O&M would be avoided if the San Ramon Canyon Stormwater Flood Reduction Project was constructed, which would permanently solve the problem.



Figure 6

The construction of a debris basin, large box culvert, retaining wall, and caissons would be avoided projects.

Operation and Maintenance (\$186,875 estimated cost from year 2013 and on): Once the debris basin has been constructed, the basin will need to be cleaned annually. The City has decided to count this avoided cost in Table 16 (as opposed to Table 19) since the debris cleanup shifts from one of “basin maintenance” as compared to “post flooding debris cleanup” on PVDS/25th Street. Table 19 does contain debris cleanup prior to the completion of the debris basin; therefore, no double-counting is taking place.

The City estimates that the amount of debris retained will closely match the amount of debris it has been removing from PVDS/25th Street on an annual basis (about 700 cubic yards). Recall from Attachment 7 that this amount was verified by a staff report the Los Angeles City staff prepared as part of their submission of a FEMA Pre-Disaster Hazard Mitigation Grant application (see Attachment 7 for a copy of the staff report).

The cost to haul debris is \$21,000 (calculated as \$30 per cubic foot x 700 cf = \$21,000). The \$30 hauling cost per cubic foot was verified by Harris and Associates Engineering.

The balance of the O&M cost, which is \$165,875 (\$186,875 - \$21,000 = \$165,875) was calculated as follows:

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Table 1 Estimated Storm Water Clean-Up Costs Per Two-Day Storm Event			
City of Los Angeles <i>Source: City of Los Angeles, Department of Public Works</i> <i>Estimate provided by Lawrence G. Cuaresman, P.E., District Engineer</i>			
Department	Assigned Personnel (Title)	Number Assigned	Total Cost (fully burdened)
Sanitation	Equipment Operators Wastewater Collection Workers II	Three (3) Eight (8)	\$21,200
Street Services	Equipment Operator Truck Drivers Lot Cleaning Supervisor	One (1) Three (3) One (1)	\$5,800
Engineering	Sr. Civil Engineer Civil Engineering Associate (II)	One (1) One (1)	\$1,625
<i>Sub-Total</i>			\$28,625
			x 3 events per year
Total Los Angeles City Annual Labor Costs			\$85,875
City of Rancho Palos Verdes <i>Source: Public Works/Engineering Department</i> <i>Estimate provided by Andy Winje, P.E.</i>			
Contractor Cost for Minimal Clean up (estimate one time per year)			\$5,000
Contractor Cost for Comprehensive Clean up (estimate \$30,000 x 2 times per year)			\$60,000
City of RPV staff time (annual)			\$15,000
Total Rancho Palos Verdes Annual Contractor and Staff Labor Costs			\$80,000
Total Annual Labor (LA City and RPV)			\$165,875

The O&M avoided cost starts in 2013 (and beyond) because the debris basin clean-out would be required on an annual basis starting in the second year of operation (or 2013).

Project #2: Caissons (\$2,000,000 estimated cost in year 2011):

The Project Study Report (completed by Harris & Associates, January 2011), identifies a shelf-ready stabilization project that could be implemented quickly should erosion of the Canyon accelerate quickly to a point where one or both of the switchbacks on PVDE were in imminent threat (PSR, pages 30-34). An additional concern is the safety of the existing 8-inch sewer line, which is located between the Canyon and the PVDE switchbacks. Even less erosion is required to compromise the existing sewer since it is closer to the Canyon edge. According to the PSR, it is recommended that PVDE and the sewer be protected if permanent improvements to address erosion within the Canyon are not constructed before the estimated 5 to 7 years during which time it is feared that unchecked erosion could destabilize the lower PVDE switchback (PSR, page 30).

To that end, the PSR identified alternative, interim projects, which could be pursued to address the stability of the PVDE switchbacks and sewer, as a separate interim project. The City and engineering consultants selected the "Cast-in-drilled-hole" (CIDH) Piles as the desired project should the preferred project not be constructed in a timely manner. Installation of CIDH piles into the existing slope outside of the PVDE switchbacks has the advantage of relatively easy access from the lower PVDE switchback where the CIDH pile caissons would be placed at an 8-foot spacing (on center), to a depth of approximately 50 to 60-feet and would require approximately eight (80) caissons total.

The estimated cost of \$2,000,000 was calculated by KOA Engineering and included as a 2011 cost because the project would be completed in "year 2." "



Figure 3 - San Ramon Canyon with PVDE, first hairpin turn to the far right of photo. A shelf ready, early action construction project was designed to implement within the next 5-7 years IF the proposed project to permanently fix the problem was not constructed. The \$2 million early action project would be avoided if the San Ramon Canyon Stormwater Flood Reduction Project was constructed.

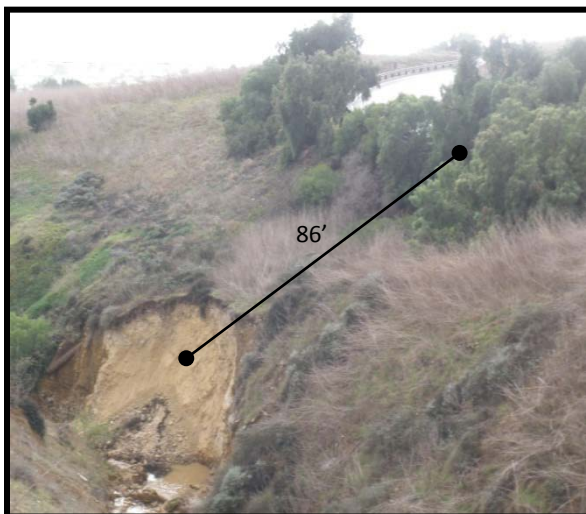


Figure 4- A closer view of the San Ramon Canyon streambed and its proximity to the first switchback on PVDE. An 8-inch sewer line runs between the Canyon and the switchback.

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The projects have been phased for this analysis, but all four features are required to achieve the same level of storm water management and protection achieved by the preferred project. All must be completed within a reasonable time period of the other features to limit exposure and potential failures of project features and existing infrastructure.

Please see Table 16 on the following page for the calculations. (Note there are two Table 16's as required by the PSP.) The first Table 16 is for the first three projects that must be completed almost simultaneously to realize project benefits. The second Table 16 is for the caissons, which can be constructed independently of the first three projects.

Table 16: Project #1, Debris Basin, Retaining Wall, and Box Culvert

Table 16 - Annual Costs of Avoided Projects						
(All avoided costs should be in 2009 dollars)						
Project: <u>San Ramon Canyon Stormwater Flood Reduction Project</u>						
	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
YEAR	Alternative (Avoided Project Name): Debris Basin, Retaining Wall, and Box Culvert				Discount Factor	Discounted Costs (e) x (f)
	Avoided Project Description: To provide the same level of protection as the preferred project, a debris basin, retaining wall, and upgraded box culvert would be required. (Debris Basin = \$6,373,411; Retaining Wall = \$799,680; Box Culvert = \$1,849,963)					
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives		
				(b) + (c) + (d)		
2009	\$ -	\$ -		\$ -	1.000	\$0
2010		\$ 799,680		\$ 799,680	0.943	\$754,098
2011	\$ 1,849,963			\$ 1,849,963	0.890	\$1,646,467
2012	\$ 6,373,411			\$ 6,373,411	0.840	\$5,353,665
2013			\$ 186,875	\$ 186,875	0.792	\$148,005
2014			\$ 186,875	\$ 186,875	0.747	\$139,596
2015			\$ 186,875	\$ 186,875	0.705	\$131,747
2016			\$ 186,875	\$ 186,875	0.665	\$124,272
2017			\$ 186,875	\$ 186,875	0.627	\$117,171
2018			\$ 186,875	\$ 186,875	0.592	\$110,630
2019			\$ 186,875	\$ 186,875	0.558	\$104,276
2020			\$ 186,875	\$ 186,875	0.527	\$98,483
2021			\$ 186,875	\$ 186,875	0.497	\$92,877
2022			\$ 186,875	\$ 186,875	0.469	\$87,644
2023			\$ 186,875	\$ 186,875	0.442	\$82,599
2024			\$ 186,875	\$ 186,875	0.417	\$77,927
2025			\$ 186,875	\$ 186,875	0.394	\$73,629
2026			\$ 186,875	\$ 186,875	0.371	\$69,331
2027			\$ 186,875	\$ 186,875	0.35	\$65,406
2028			\$ 186,875	\$ 186,875	0.33	\$61,669
2029			\$ 186,875	\$ 186,875	0.312	\$58,305
2030			\$ 186,875	\$ 186,875	0.294	\$54,941
2031			\$ 186,875	\$ 186,875	0.278	\$51,951
2032			\$ 186,875	\$ 186,875	0.262	\$48,961
2033			\$ 186,875	\$ 186,875	0.247	\$46,158
2034			\$ 186,875	\$ 186,875	0.233	\$43,542
2035			\$ 186,875	\$ 186,875	0.22	\$41,113

Table 16 - Annual Costs of Avoided Projects						
(All avoided costs should be in 2009 dollars)						
Project: <u>San Ramon Canyon Stormwater Flood Reduction Project</u>						
	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
YEAR	Alternative (Avoided Project Name): Debris Basin, Retaining Wall, and Box Culvert				Discount Factor	Discounted Costs (e) x (f)
	Avoided Project Description: To provide the same level of protection as the preferred project, a debris basin, retaining wall, and upgraded box culvert would be required. (Debris Basin = \$6,373,411; Retaining Wall = \$799,680; Box Culvert = \$1,849,963)					
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives		
				(b) + (c) + (d)		
2036			\$ 186,875	\$ 186,875	0.207	\$38,683
2037			\$ 186,875	\$ 186,875	0.196	\$36,628
2038			\$ 186,875	\$ 186,875	0.185	\$34,572
2039			\$ 186,875	\$ 186,875	0.174	\$32,516
2040			\$ 186,875	\$ 186,875	0.164	\$30,648
2041			\$ 186,875	\$ 186,875	0.155	\$28,966
2042			\$ 186,875	\$ 186,875	0.146	\$27,284
2043			\$ 186,875	\$ 186,875	0.138	\$25,789
2044			\$ 186,875	\$ 186,875	0.13	\$24,294
2045			\$ 186,875	\$ 186,875	0.123	\$22,986
2046			\$ 186,875	\$ 186,875	0.116	\$21,678
2047			\$ 186,875	\$ 186,875	0.109	\$20,369
2048			\$ 186,875	\$ 186,875	0.103	\$19,248
2049			\$ 186,875	\$ 186,875	0.097	\$18,127
2050			\$ 186,875	\$ 186,875	0.092	\$17,193
2051			\$ 186,875	\$ 186,875	0.087	\$16,258
2052			\$ 186,875	\$ 186,875	0.082	\$15,324
2053			\$ 186,875	\$ 186,875	0.077	\$14,389
2054			\$ 186,875	\$ 186,875	0.073	\$13,642
2055			\$ 186,875	\$ 186,875	0.069	\$12,894
2056			\$ 186,875	\$ 186,875	0.065	\$12,147
2057			\$ 186,875	\$ 186,875	0.06	\$11,213
2058			\$ 186,875	\$ 186,875	0.058	\$10,839
2059			\$ 186,875	\$ 186,875	0.055	\$10,278
2060			\$ 186,875	\$ 186,875	0.053	\$9,904
2061			\$ 186,875	\$ 186,875	0.05	\$9,344
2062			\$ 186,875	\$ 186,875	0.048	\$8,970
Project Life	51 years				...	

Table 16 - Annual Costs of Avoided Projects						
(All avoided costs should be in 2009 dollars)						
Project: <u>San Ramon Canyon Stormwater Flood Reduction Project</u>						
	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
YEAR	Alternative (Avoided Project Name): Debris Basin, Retaining Wall, and Box Culvert				Discount Factor	Discounted Costs (e) x (f)
	Avoided Project Description: To provide the same level of protection as the preferred project, a debris basin, retaining wall, and upgraded box culvert would be required. (Debris Basin = \$6,373,411; Retaining Wall = \$799,680; Box Culvert = \$1,849,963)					
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives		
				(b) + (c) + (d)		
Total Present Value of Discounted Costs (Sum of Column (g))						\$10,228,642
(%) Avoided Cost Claimed by Project						100%
Total Present Value of Discounted Avoided Project Costs Claimed by alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)						\$10,228,642
Comments:						

Table 16: Project #2, Caissons

Table 16 - Annual Costs of Avoided Projects						
(All avoided costs should be in 2009 dollars)						
Project: <u>San Ramon Canyon Stormwater Flood Reduction Project</u>						
	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
YEAR	Alternative (Avoided Project Name): Caissons on PVDE.				Discount Factor	Discounted Costs (e) x (f)
	Avoided Project Description: Construction of caissons on PVDE.					
	Avoided Capital Costs	Avoided Replace ment Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives		
				(b) + (c) + (d)		
2009	\$ -	\$ -		\$ -	1.000	\$0
2010				\$ -	0.943	\$0
2011	\$ 2,000,000			\$ 2,000,000	0.890	\$1,780,000
2012				\$ -	0.840	\$0
2013				\$ -	0.792	\$0
2014				\$ -	0.747	\$0
2015				\$ -	0.705	\$0
2016				\$ -	0.665	\$0
2017				\$ -	0.627	\$0
2018				\$ -	0.592	\$0
2019				\$ -	0.558	\$0
2020				\$ -	0.527	\$0
2021				\$ -	0.497	\$0
2022				\$ -	0.469	\$0
2023				\$ -	0.442	\$0
2024				\$ -	0.417	\$0
2025				\$ -	0.394	\$0
2026				\$ -	0.371	\$0
2027				\$ -	0.35	\$0
2028				\$ -	0.33	\$0
2029				\$ -	0.312	\$0
2030				\$ -	0.294	\$0
2031				\$ -	0.278	\$0
2032				\$ -	0.262	\$0
2033				\$ -	0.247	\$0
2034				\$ -	0.233	\$0
2035				\$ -	0.22	\$0
2036				\$ -	0.207	\$0
2037				\$ -	0.196	\$0
2038				\$ -	0.185	\$0
2039				\$ -	0.174	\$0
2040				\$ -	0.164	\$0

Prop 1E Stormwater Flood Management Grant

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Table 16 - Annual Costs of Avoided Projects						
(All avoided costs should be in 2009 dollars)						
Project: <u>San Ramon Canyon Stormwater Flood Reduction Project</u>						
	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
YEAR	Alternative (Avoided Project Name): Caissons on PVDE.				Discount Factor	Discounted Costs (e) x (f)
	Avoided Project Description: Construction of caissons on PVDE.					
	Avoided Capital Costs	Avoided Replace ment Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives		
				(b) + (c) + (d)		
2041				\$ -	0.155	\$0
2042				\$ -	0.146	\$0
2043				\$ -	0.138	\$0
2044				\$ -	0.13	\$0
2045				\$ -	0.123	\$0
2046				\$ -	0.116	\$0
2047				\$ -	0.109	\$0
2048				\$ -	0.103	\$0
2049				\$ -	0.097	\$0
2050				\$ -	0.092	\$0
2051				\$ -	0.087	\$0
2052				\$ -	0.082	\$0
2053				\$ -	0.077	\$0
2054				\$ -	0.073	\$0
2055				\$ -	0.069	\$0
2056				\$ -	0.065	\$0
2057				\$ -	0.06	\$0
2058				\$ -	0.058	\$0
2059				\$ -	0.055	\$0
2060				\$ -	0.053	\$0
2061				\$ -	0.05	\$0
2062				\$ -	0.048	\$0
Project Life	51 years				...	
Total Present Value of Discounted Costs (Sum of Column (g))						\$1,780,000
(% Avoided Cost Claimed by Project						100%
Total Present Value of Discounted Avoided Project Costs Claimed by alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)						\$1,780,000
Comments:						

Table 17: –Annual Other Water Supply Benefits

The project does not provide any other annual benefits to the water supply. Table 17 is therefore not included in this narrative.

Table 18: Total Water Supply Benefits

Table 18 provides the roll up benefits to the water supply and projects avoided based on the completion of the preferred project. As noted, the entire benefit is derived from the projects that are avoided with the implementation of the project. The total present value of all discounted benefits is \$12.008 million.

Table 18 - Total Water Supply Benefits (All benefits should be in 2009 dollars) Project: <u>San Ramon Canyon Stormwater Flood Reduction Project</u>			
Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (d) (a) + (c) or (b) + (c)
\$0	\$12,008,642	\$0	\$12,008,642
Comments:			

Appendix

There are no attachments necessary for Attachment 8. All supporting data is provided within the narrative.